

Guide d'exploitation  
User's manual  
Bedienungsanleitung  
Guía de explotación

# Altivar 58F

## Telemecanique

Variateurs de vitesse CVF pour  
moteurs asynchrones,  
Variable speed controllers FVC  
for asynchronous motors,  
FVC Frequenzumrichter  
für Drehstrom-Asynchronmotoren,  
Variadores de velocidad CVF  
para motores asíncronos



Merlin Gerin  
Modicon  
Square D  
Telemecanique

Schneider  
Electric

Variateurs de vitesse CVF pour moteurs asynchrones

Page 2

---

Variable speed controllers FVC for asynchronous motors

Page 28

---

FVC Frequenzumrichter für Drehstrom-Asynchronmotoren

Seite 54

---

Variadores de velocidad CVF para motores asíncronos

Página 80

---

FRANÇAIS

ENGLISH

DEUTSCH

ESPAÑOL

**IT NEUTRAL POINT CONNECTION :** In the event of use on a 3-phase network with a voltage greater than 480V ±10 % with an isolated or high-impedance system (IT), the internal EMC filter capacitors which are connected to ground must be disconnected. Consult Schneider product support who are the only people qualified to perform this operation.

When the speed controller is powered up, the power components and some of the control components are connected to the line supply. *It is extremely dangerous to touch them. The speed controller cover must be kept closed.*

In general, the speed controller power supply must be disconnected *before any operation on either the electrical or mechanical parts of the installation or machine.*

After the ALTIVAR has been switched off and the green LED has gone out, *wait for 3 minutes before working on the equipment.* This is the time required for the capacitors to discharge.

The motor can be stopped during operation by inhibiting start commands or the speed reference while the speed controller remains powered up. If personnel safety requires prevention of sudden restarts, this electronic locking system is not sufficient: *fit a cut-off on the power circuit.*

The speed controller is fitted with safety devices which, in the event of a fault, can shut down the speed controller and consequently the motor. The motor itself may be stopped by a mechanical blockage. Finally, voltage variations, especially line supply failures, can also cause shutdowns.

If the cause of the shutdown disappears, there is a risk of restarting which may endanger certain machines or installations, especially those which must conform to safety regulations.

*In this case the user must take precautions against the possibility of restarts, in particular by using a low speed detector to cut off power to the speed controller if the motor performs an unprogrammed shutdown.*

The products and equipment described in this document may be changed or modified at any time, either from a technical point of view or in the way they are operated. Their description can in no way be considered contractual.

The speed controller must be installed and set up in accordance with both international and national standards. Bringing the device into conformity is the responsibility of the systems integrator who must observe the EMC directive among others within the European Union.

The specifications contained in this document must be applied in order to comply with the essential requirements of the EMC directive.

The Altivar 58 must be considered as a component: it is neither a machine nor a device ready for use in accordance with European directives (machinery directive and electromagnetic compatibility directive). It is the responsibility of the end user to ensure that the machine meets these standards.

# Contents

---

<u>Preliminary recommendations</u>	30
<u>Selecting a Speed Controller</u>	31
<u>Available Torque</u>	32
<u>Technical Specifications</u>	33
<u>Dimensions - Mounting Recommendations</u>	35
<u>Mounting and Temperature Conditions</u>	36
<u>Removing the IP 41 Protective Blanking Cover</u>	38
<u>Mounting in a Wall-fixing or Floor-standing Enclosure</u>	39
<u>Electromagnetic Compatibility - Mounting</u>	40
<u>Electromagnetic Compatibility - Wiring</u>	41
<u>Access to Terminals - Power Terminals</u>	42
<u>Control Terminals</u>	44
<u>Selecting and wiring the encoder</u>	46
<u>Connection Diagrams</u>	47
<u>Wiring Recommendations, Use</u>	51
<u>Setup</u>	52
<u>Operation - Maintenance - Spares and Repairs</u>	53

# Preliminary recommendations

## Delivery

Check that the speed controller reference printed on the label is the same as that on the delivery note corresponding to the purchase order.

Remove the Altivar 58F from its packaging and check that it has not been damaged in transit.

## Handling and storage

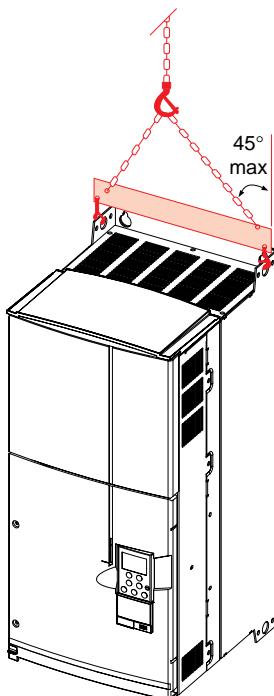
To ensure the speed controller is protected before installation, handle and store the device in its packaging.

## Handling on installation

The Altivar 58F range comprises 6 sizes of device, with various weights and dimensions.

Small speed controllers can be removed from their packaging and installed without a handling device.

A hoist must be used with large speed controllers; for this reason they are supplied with handling "lugs". The precautions described below must be observed:



# Selecting a Speed Controller

## 3-phase supply voltage (1) U1...U2 : 380...500 V 50/60 Hz

Motor		Line supply				Altivar 58F			
Power indicated on motor rating plate (3)		Line current (2)		Max. prospective line Isc		Nominal current	Max. transient current (4)	Power dissipated at nominal load (5)	Reference
		at U1	at U2	at U1	at U2				
kW	HP	A	A	kA	kA	A	A	W	
0.75	1	3.4	2.6	5	5	2.3	3.1	55	ATV-58FHU18N4
1.5	2	6	4.5	5	5	4.1	5.6	65	ATV-58FHU29N4
2.2	3	7.8	6	5	5	5.8	7.9	105	ATV-58FHU41N4
3	–	10.2	7.8	5	5	7.8	10.6	145	ATV-58FHU54N4
4	5	13	10.1	5	5	10.5	14.3	180	ATV-58FHU72N4
5.5	7.5	17	13.2	5	5	13	17.7	220	ATV-58FHU90N4
7.5	10	26.5	21	22	22	17.6	24	230	ATV-58FHD12N4
11	15	35.4	28	22	22	24.2	32.9	340	ATV-58FHD16N4
15	20	44.7	35.6	22	22	33	44.9	410	ATV-58FHD23N4
18.5	25	43	35	22	65	41	55	670	ATV-58FHD28N4
22	30	51	41	22	65	48	66	780	ATV-58FHD33N4
30	40	68	55	22	65	66	90	940	ATV-58FHD46N4
37	50	82	66	22	65	79	108	940	ATV-58FHD54N4
45	60	101	82	22	65	94	127	1100	ATV-58FHD64N4
55	75	121	98	22	65	116	157	1475	ATV-58FHD79N4

(1) Nominal supply voltages : min. U1, max. U2.

(2) Typical value for a 4-pole motor with no additional choke.

(3) These power levels are for a maximum switching frequency of 2 to 4 kHz, depending on the rating, and continuous operation. Switching frequencies are detailed in the section on "Technical Specifications".

Using the ATV-58F with a higher switching frequency:

- For continuous operation derate by one power rating, for example: ATV-58FHU18N4 for 0.37 kW – ATV-58FHD12N4 for 5.5 kW.
- If no power derating is applied, do not exceed the following operating conditions: Cumulative running time 36 s maximum per 60 s cycle (load factor 60 %).

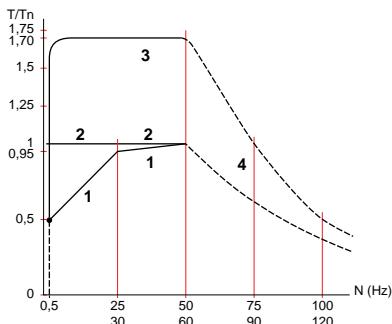
(4) For 60 seconds.

(5) These power levels are given for the maximum permissible switching frequency in continuous operation (2 or 4 kHz, depending on the rating).

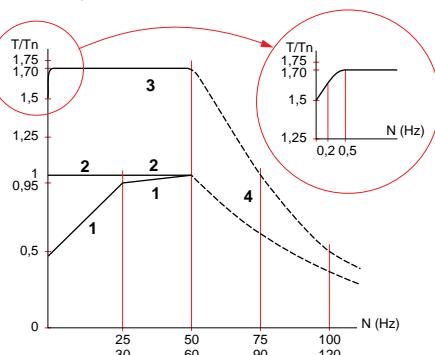
# Available Torque

## Torque characteristics:

Open loop:



Closed loop:



- 1 Self-cooled motor: continuous useful torque
- 2 Force-cooled motor: continuous useful torque
- 3 Transient overtorque for max. 60 seconds.
- 4 Torque at overspeed with constant power

Available overtorque:

- 200 % of nominal motor torque for 2 seconds, and 170 % for 60 seconds.

## Continuous operation

For self-cooled motors, cooling is linked to the motor speed. Derating therefore occurs at speeds of less than half the nominal speed.

## Overspeed operation

As the voltage can no longer change with the frequency, there is a reduction in torque. Check with the manufacturer that the motor can operate at overspeed.

### Note:

With a special motor the nominal and maximum frequencies can be adjusted from 40 to 450 Hz using the operator display module or the PC software.

# Technical Specifications

## Environment

Degree of protection	IP 21 and IP 41 on upper part (conforming to EN 50178)
Vibration resistance	Conforming to IEC 68-2-6: <ul style="list-style-type: none"><li>• 1.5 mm peak from 2 to 13 Hz</li><li>• 1 gn from 13 to 200 Hz.</li></ul>
Shock resistance	Conforming to IEC 68-2-27: <ul style="list-style-type: none"><li>• 15 g, 11 ms</li></ul>
Maximum ambient pollution	Degree 2 conforming to IEC 664-1 and EN 50718.
Maximum relative humidity	93 % without condensation or dripping water conforming to IEC 68-2-3
Ambient temperature around the unit	<p>Storage: - 25 °C to + 65 °C</p> <p>Operation:</p> <p>Speed controllers ATV-58FHU18N4 to U90N4:</p> <ul style="list-style-type: none"><li>• - 10 °C to + 50 °C without derating</li><li>• up to + 60 °C derating the current by 2.2 % per °C over 50°C.</li></ul> <p>Speed controllers ATV-58FHD12N4 to D23N4 :</p> <ul style="list-style-type: none"><li>• - 10 °C to + 40 °C without derating</li><li>• up to + 50 °C derating the current by 2.2 % per °C over 40 °C</li></ul> <p>Speed controllers ATV-58FHD28N4 to D79N4 :</p> <ul style="list-style-type: none"><li>• - 10 °C to + 40 °C without derating</li><li>• up to + 50 °C with fan kit derating the current by 2.2 % per °C over 40 °C</li></ul>
Maximum operating altitude	1000 m without derating (above this derate the current by 1 % for each additional 100 m)
Operating position	Vertical

# Technical Specifications

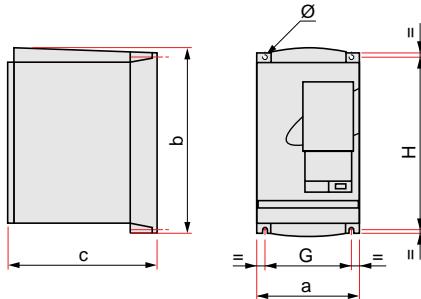
## Electrical specifications

Power supply	Voltage	380 V - 10 % to 500 V + 10 % 3-phase
	Frequency	50/60 Hz ± 5 %
Output voltage		Maximum voltage equal to line supply voltage
Electrical isolation		Electrical isolation between power and control (inputs, outputs, power supplies)
Output frequency range		0.1 to 450 Hz
Switching frequency		Configurable: <ul style="list-style-type: none"><li>• without derating: 0.5 - 1 - 2 - 4 kHz for speed controllers ATV-58FHU18N4 to D46N4 0.5 - 1 - 2 kHz for speed controllers ATV-58FHD54N4 to D79N4</li><li>• without derating with intermittent operating cycle or with derating by one power rating in continuous operation: 8 - 12 - 16 kHz for speed controllers ATV-58FHU18N4 to D23N4 8 - 12 kHz for speed controllers ATV-58FHD28N4 to D46N4 4 - 8 kHz for speed controllers ATV-58FHD54N4 to D79N4</li></ul>
Speed range		<ul style="list-style-type: none"><li>• 1 to 1000 in closed loop</li><li>• 1 to 100 in open loop</li></ul>
Speed accuracy		For a torque variation of 0.2 Tn to Tn: <ul style="list-style-type: none"><li>• ± 1 % of nominal speed, without speed feedback</li><li>• ± 0.1 % of nominal speed, with tachogenerator feedback (option card)</li><li>• ± 0.02 % of nominal speed, with feedback by encoder</li></ul>
Braking torque		30 % of motor nominal torque without braking resistor (typical value). Up to 150 % with braking resistor fitted as option
Transient overtorque		<ul style="list-style-type: none"><li>• 200 % of motor nominal torque (typical values to ±10 %) for 2 seconds</li><li>• 170 % of motor nominal torque (typical values to ±10 %) for 60 seconds</li></ul>
Protection and safety features of speed controller		<ul style="list-style-type: none"><li>• Short-circuit protection:<ul style="list-style-type: none"><li>- between output phases</li><li>- between output phases and earth</li><li>- on internal supply outputs</li></ul></li><li>• Thermal protection against overheating and overcurrents</li><li>• Undervoltage and overvoltage supply</li><li>• Loss of supply phase safety circuit (avoids single-phase operation)</li></ul>
Motor protection		<ul style="list-style-type: none"><li>• Thermal protection integrated in speed controller via continuous calculation of <math>I^2t</math> taking speed into account. Memorization of motor thermal state when speed controller is powered down. Function can be modified (using display module or PC software) depending on the type of motor cooling</li><li>• Protection against motor phase breaks</li><li>• Protection via PTC probes with option card</li></ul>

# Dimensions - Mounting Recommendations

## Dimensions

### ATV-58FH•••••



ATV-58FH	a mm	b mm	c mm	G mm	H mm	Ø mm	Weight kg
U18N4, U29N4, U41N4	150	230	184	133	210	5	3.8
U54N4, U72N4, U90N4	175	286	184	155	270	5.5	6.9
D12N4, D16N4	230	325	210	200	310	5.5	13
D23N4	230	415	210	200	400	5.5	15
D28N4, D33N4, D46N4	240	550	283	205	530	7	34
D54N4, D64N4, D79N4	350	650	304	300	619	9	57

ATV-58FH	Fan flow rate
U18N4	not cooled
U29N4, U41N4, U54N4	36 m <sup>3</sup> /hour
U72N4, U90N4, D12N4, D16N4, D23N4,	72 m <sup>3</sup> /hour
D28N4, D33N4, D46N4	292 m <sup>3</sup> /hour
D54N4, D64N4, D79N4	492 m <sup>3</sup> /hour

## Mounting recommendations

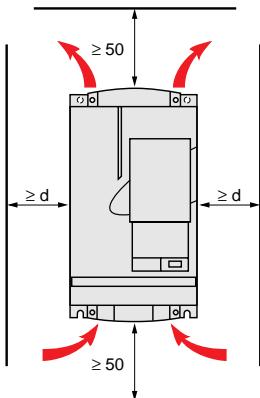
Install the unit vertically at + /-10 °.

Do not place it close to heating elements.

Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.

# Mounting and Temperature Conditions

## ATV-58FHU18N4 to D23N4



Free space in front of unit: 10 mm minimum.

## ATV-58FHU18N4 to U90N4 :

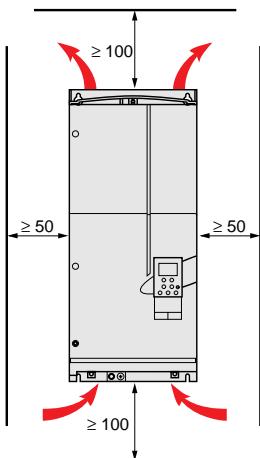
- From - 10°C to 40°C :  $d \geq 50$  mm : no special precautions.  
 $d = 0$  : remove the protective blanking cover from the top of the speed controller as shown overleaf (the degree of protection is then IP 20).
- From 40°C to 50°C :  $d \geq 50$  mm : remove the protective blanking cover from the top of the speed controller as shown overleaf (the degree of protection is then IP 20).  
 $d = 0$  : add control ventilation kit VW3A5882● (see catalogue).
- From 50°C to 60°C :  $d \geq 50$  mm : add control ventilation kit VW3A5882● (see catalogue).  
Derate the current by 2.2 % per °C over 50°C.

## ATV-58FHD12N4 to D23N4 :

- From - 10°C to 40°C :  $d \geq 50$  mm : no special precautions.  
 $d = 0$  : remove the protective blanking cover from the top of the speed controller as shown overleaf (the degree of protection is then IP 20).
- From 40°C to 50°C :  $d \geq 50$  mm : remove the protective blanking cover from the top of the speed controller as shown overleaf (the degree of protection is then IP 20).  
Derate the current by 2.2 % per °C over 40°C.  
 $d = 0$  : add control ventilation kit VW3-A5882● (see catalogue).  
Derate the current by 2.2 % per °C over 40°C.

# Mounting and Temperature Conditions

## ATV-58FHD28N4 to D79N4

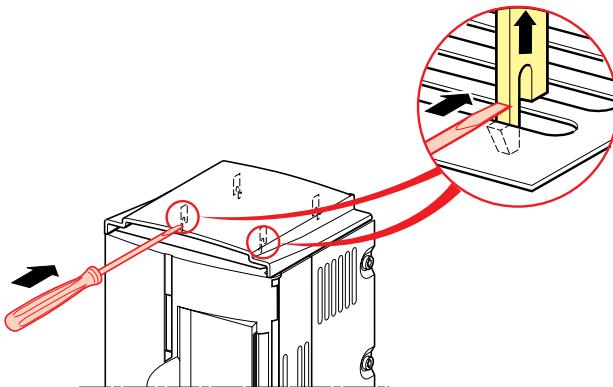


Free space in front of unit: 50 mm minimum.

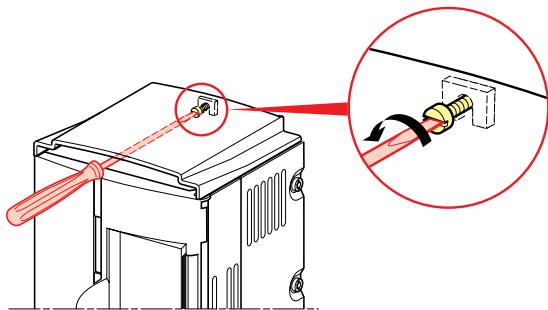
- From -10°C to 40°C : no special precautions.
- From 40°C to 60°C : add control ventilation kit VW3A588●● (see catalogue). Derate the current by 2.2 % per °C over 40°C.

# Removing the IP 41 Protective Blanking Cover

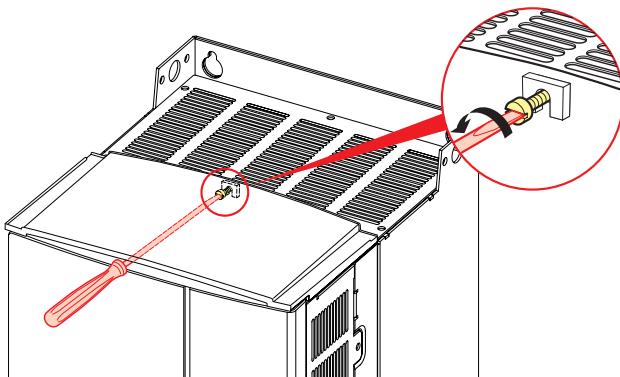
ATV-58FHU18N4 to U90N4



ATV-58FHD12N4 to D23N4



ATV-58FHD28N4 to D79N4

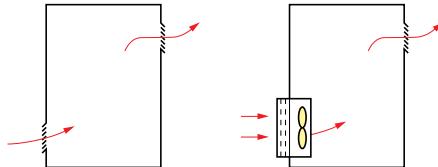


# Mounting in a Wall-fixing or Floor-standing Enclosure

Observe the mounting recommendations on the previous page.

To ensure proper air circulation in the speed controller:

- fit ventilation grilles
- ensure that ventilation is adequate: if not install forced ventilation with a filter
- use special IP 54 filters



## Dust and damp proof metal enclosure (degree of protection IP 54)

The speed controller must be mounted in a dust and damp proof casing in certain environmental conditions: dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc.

To avoid hot spots in the speed controller, add a fan to circulate the air inside the enclosure, reference VW3A5882● (see catalogue).

This enables the speed controller to be used in an enclosure where the maximum internal temperature can reach 60 °C.

### Calculating the size of the enclosure

Maximum thermal resistance R<sub>th</sub> (°C/W) :

$$R_{th} = \frac{\theta^e - \theta^o}{P}$$

θ<sup>o</sup> = maximum temperature inside enclosure in °C,  
θ<sup>e</sup> = maximum external temperature in °C,  
P = total power dissipated in the enclosure in W.

Power dissipated by speed controller: [see](#) section Selecting a Speed Controller.  
Add the power dissipated by the other equipment components.

Useful heat dissipation surface of casing S (m<sup>2</sup>) :  
(sides + top + front panel if wall-mounted)

$$S = \frac{K}{R_{th}}$$

K = thermal resistance per m<sup>2</sup> of casing.

For metal casing:      K = 0.12 with internal fan,  
                                  K = 0.15 without fan.

#### Note:

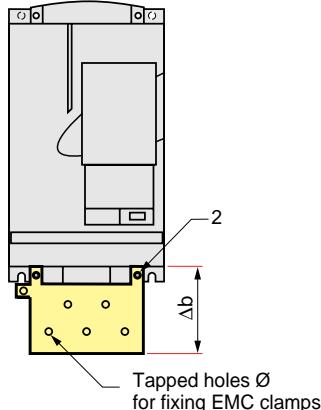
Do not use insulated enclosures as they have a poor level of conductivity.

Above rating ATV-58FHD28N4, IP54 kits can be used to dissipate power to the outside by ventilation (see catalogue).

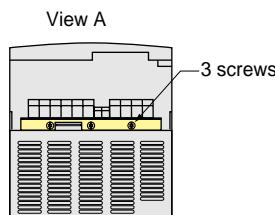
# Electromagnetic Compatibility - Mounting

## EMC mounting plate supplied with speed controller

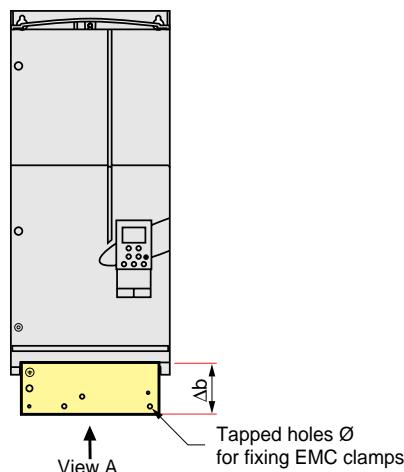
Fix the EMC equipotentiality mounting plate to the holes in the ATV-58F heatsink using the screws supplied as shown in the drawings below.



ATV-58FH	$\Delta b$	$\emptyset$
U18N4, U29N4, U41N4	64.5	4
U54N4, U72N4, U90N4	64.5	4
D12N4, D18N4	76	4
D23N4	76	4



ATV-58FH	$\Delta b$	$\emptyset$
D28N4, D33N4, D46N4	80	5
D54N4, D64N4, D79N4	110	5



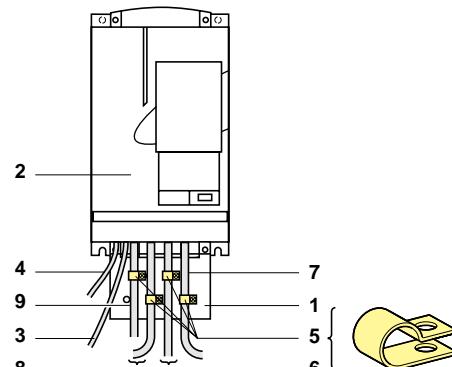
# Electromagnetic Compatibility - Wiring

## Principle

- Grounds between speed controller, motor and cable shielding must have "high frequency" equipotentiality.
- Use shielded cables with shielding connected to the ground at 360° at both ends of the motor cable, braking resistor (if fitted) and control-command cables. Conduit or metal ducting can be used for part of the shielding length provided that there is no break in continuity.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable.

## Installation diagram

- 1 Metal sheet machine grounding supplied with the speed controller, to be mounted as shown in the drawing.
- 2 Altivar 58F
- 3 Non-shielded power supply wires or cable.
- 4 Non-shielded wires for fault relay contacts.
- 5 Fix and ground the shielding of cables 6, 7, 8 and 9 as close as possible to the speed controller:
  - strip the shielding
  - use the correct size clamps on the stripped part of the shielding to fix to metal sheet 1. The shielding must be clamped tightly enough to the metal sheet to ensure good contact.
  - clamp types: stainless steel.
- 6 Shielded cable for motor connection with shielding connected to ground at both ends. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.
- 7 Shielded cable for connecting the encoder. The shielding must be connected to ground at both ends. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.
- 8 Shielded cable for connecting braking resistor (if fitted). The shielding must be connected to ground at both ends. The shielding must be continuous and intermediate terminals must be in EMC shielded metal cases.
- 9 Shielded cable for connecting the control/command wiring. For applications requiring several conductors, use small cross-sections (0.5 mm<sup>2</sup>). The shielding must be connected to ground at both ends. The shielding must be continuous and intermediate terminals must be in EMC shielded metal cases.



ENGLISH

### Note:

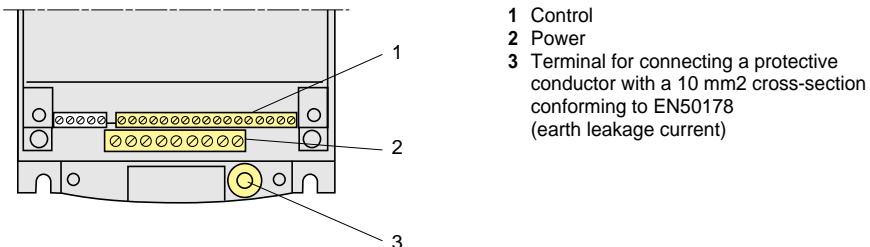
- If using an additional input filter, it should be mounted behind the speed controller and connected directly to the line supply via an unshielded cable. Link 3 on the speed controller is via the filter output cable.
- The HF equipotential ground connection between the speed controller, motor and cable shielding does not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.

# Access to Terminals - Power Terminals

## Access to terminals

To access the terminals, switch off the speed controller, then unlock and open the hinged cover.

**Location of terminals:** on the lower part of the Altivar.



## Power Terminals

### Terminal specifications

Altivar ATV-58FH	Terminals	Maximum connection capacity		Tightening torque in Nm
		AWG	mm <sup>2</sup>	
U18N4, U29N4, U41N4	all terminals	AWG 8	6	0.75
U54N4, U72N4, U90N4	all terminals	AWG 8	6	0.75
D12N4, D16N4, D23N4	all terminals	AWG 6	10	2
D28N4	PA PB	AWG 6	10	2
	other terminals	AWG 4	16	3
D33N4, D46N4	PA PB	AWG 4	16	3
	other terminals	AWG 2	35	4
D54N4, D64N4, D79N4	PA PB	AWG 2	35	4
	other terminals	AWG 2/0	70	10

# Power Terminals

## Arrangement of terminals

±	L1	L2	L3	PA	PB	U	V	W	±
---	----	----	----	----	----	---	---	---	---

ATV-58FHU18N4 to D23N4

±	L1	L2	L3	+	-	PA	PB	U	V	W	±
---	----	----	----	---	---	----	----	---	---	---	---

ATV-58FHD28N4 to D79N4

## Function of terminals

Terminals	Function	For Altivar ATV-58FH
±	Altivar ground terminal	All ratings
L1 L2 L3	Power supply	All ratings
+	DC bus outputs	D28N4 to D79N4
PA PB	Output to braking resistor	All ratings
U V W	Outputs to motor	All ratings
±	Altivar ground terminal	All ratings

## Access to DC bus:

connecting an external DC supply

For ATV-58FHU18N4 to D23N4, connect the supply + to the PA terminal and connect the supply - to the J16 tag connector located next to the power terminal.

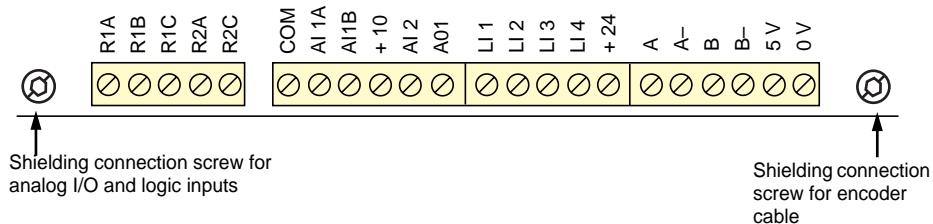
For ATV-58FHD28N4 to D79N4 an external DC supply is connected to the speed controller + and - terminals, but an external device with resistors for preloading the filter capacitors is required.

# Control Terminals

## Terminal characteristics

- 2 screws with tag connectors for connecting the shielding
- 4 removable terminals with locating device, one for relay contacts, the other 3 for low level I/O:
  - Maximum connection capacity: 1.5 mm<sup>2</sup> - AWG 16
  - Max. tightening torque: 0.25 Nm.

## Arrangement of terminals



### Note:

Power down before removing terminals. Use a 4 mm flat blade screwdriver, inserted between the fixed and movable parts of the terminal, and carefully separate.

# Control terminals

## Function of terminals

Terminals	Function	Electrical characteristics
R1A R1B R1C	C/O contact at common point (R1C) of R1 fault relay	<ul style="list-style-type: none"><li>• min. switching capacity: 10 mA for 24 V ...</li><li>• max. switching capacity on inductive load: 1.5 A for 250 V <math>\sim</math> (<math>\cos \varphi 0.4</math>) and 30 V ... (L/R 7 ms)</li><li>• max. response time: 20 ms</li></ul>
R2A R2C	N/O contact of R2 programmable relay	
COM	Common for logic and analog inputs	
AI1A AI1B	Analog input for differential bipolar voltage	<ul style="list-style-type: none"><li>• <math>\pm 10</math> V, impedance 40 k<math>\Omega</math> in differential mode, 20 k<math>\Omega</math> in common mode</li><li>• max. permissible voltage <math>\pm 30</math> V</li><li>• resolution 11 bits + sign</li><li>• accuracy <math>\pm 0.5</math> % of max. value</li><li>• linearity <math>\pm 0.2</math> % of max. value</li><li>• sampling time 2 ms max.</li></ul>
+ 10	Power supply for potentiometer with setpoint 1 to 10 k $\Omega$	<ul style="list-style-type: none"><li>• voltage +10 V (- 0 + 10 %) 10 mA max. protected against short-circuits and overloads</li></ul>
AI2	Analog input for current, programmable	<ul style="list-style-type: none"><li>• input 0 - 20 mA, programmable for X - Y mA by configuring X and Y (0 to 20)</li><li>• impedance 100 <math>\Omega</math></li><li>• max. permissible current 50 mA</li><li>• resolution 0.02 mA</li><li>• accuracy <math>\pm 1</math> % of max. value</li><li>• linearity <math>\pm 0.5</math> % of max. value</li><li>• sampling time 2ms max.</li></ul>
AO1	Analog output for current, programmable	<ul style="list-style-type: none"><li>• output 0 - 20 mA, programmable for X - Y mA by configuring X and Y (0 to 20)</li><li>• load impedance 500 <math>\Omega</math> max.</li><li>• resolution 0.02 mA</li><li>• accuracy <math>\pm 1</math> % of max. value</li><li>• linearity <math>\pm 0.5</math> % of max. value</li><li>• sampling time 2 ms max.</li></ul>
LI1 LI2 LI3 LI4	Programmable logic inputs	<ul style="list-style-type: none"><li>• impedance 3.5 k<math>\Omega</math></li><li>• power supply + 24 V (max. 30 V)</li><li>• state 0 if &lt; 5 V, state 1 if &gt; 11 V</li><li>• sampling time 2 ms max.</li></ul>
+ 24	Power supply for inputs	<ul style="list-style-type: none"><li>• voltage + 24 V protected against short-circuits and overloads, min. 18 V, max. 30 V</li><li>• max. flow rate 120 mA</li></ul>
A A-  B B-	Incremental logic inputs	<ul style="list-style-type: none"><li>• for incremental optical encoder with RS422-compatible differential outputs</li><li>• impedance 330 <math>\Omega</math></li><li>• max. 5000 pulses / rev., min. 100 pulses / rev.</li><li>• max. frequency 200 kHz at high speed HSP</li></ul>
+ 5 V 0 V	Power supply for encoder	<ul style="list-style-type: none"><li>• voltage 5 V (max. 5.5 V) protected against short-circuits and overloads</li><li>• max. current 200 mA</li></ul>

# Selecting and wiring the encoder

## Selecting the encoder

Incremental optical encoder with RS 422-compatible 5 volt differential outputs, max. consumption 200 mA.

2 limits must be observed when selecting the resolution:

- Electrical limit: max. frequency 200 kHz at high speed HSP.
- Programmable values limit: 100 to 5000 pulses / rev.

Choose the max. standard resolution within these limits to obtain optimum accuracy.

### Example:

- Motor 1500 rpm 50 Hz.
- High speed HSP = 60 Hz or 1800 rpm or 30 rps.
- Max signal frequency 200 kHz.
- Calculated max. number of pulses per rev. =  $200000 / 30 = 6666$ .
- Encoder selection: 5000 pulses per rev., max. standard resolution within calculated limit of 6666 pulses per rev. and programming limit of 5000 pulses per rev.

## Wiring the encoder

Use a shielded cable comprising 3 twisted pairs with a pitch of between 25 and 50 mm. Connect the shielding to ground at both ends.

The minimum cross-section of the conductors must comply with the table below to limit line voltage drop:

Max. cable length	Max. consumption current of encoder	Minimum cross-section of conductors
10 m	100 mA	0.2 mm <sup>2</sup> or AWG 24
	200 mA	0.2 mm <sup>2</sup> or AWG 24
50 m	100 mA	0.5 mm <sup>2</sup> or AWG 20
	200 mA	0.75 mm <sup>2</sup> or AWG 18
100 m	100 mA	0.75 mm <sup>2</sup> or AWG 18
	200 mA	1.5 mm <sup>2</sup> or AWG 16

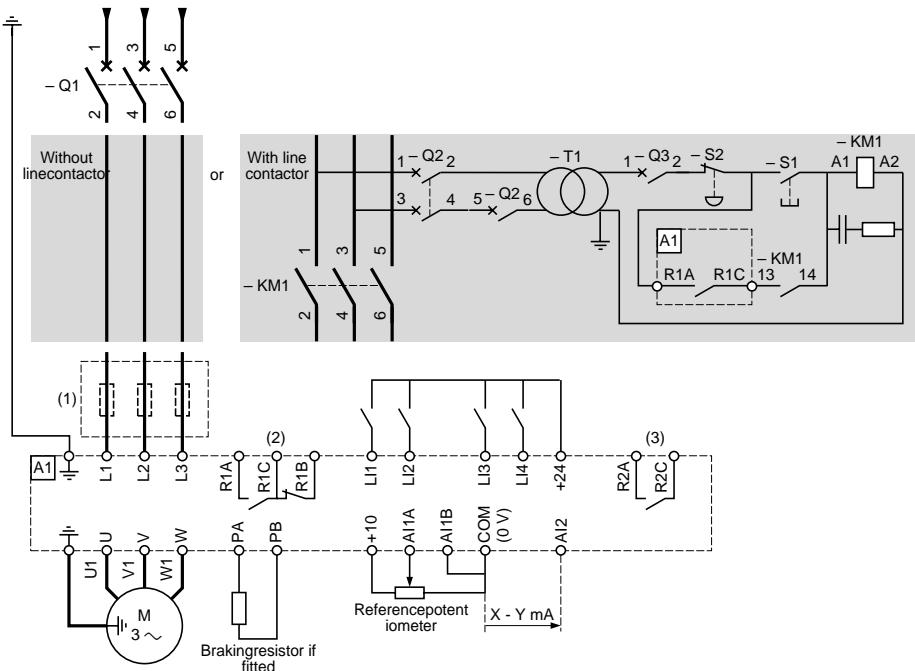
## Matching encoder outputs

- There is no need to load with matching impedances.
- Where several loads (speed controllers, axis control modules, etc) are connected in parallel to the encoder outputs, the resulting impedance must not be below 100 ohms.
- Consumption for the encoder power supply must not exceed 200 mA.

# Connection Diagrams

## Open loop control, unipolar speed reference

### 3-phase power supply



- (1) Line choke if fitted (ATV-58FHU18N4 to D23N4).  
(2) Fault relay contacts for remote signalling of speed controller status.  
(3) R2 reassignable relay

#### Note:

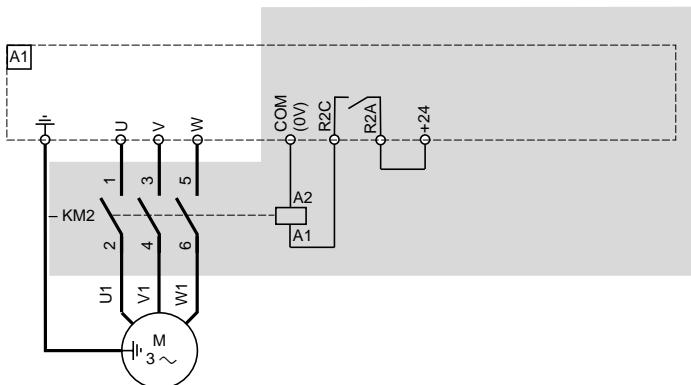
Fit interference suppressors to all inductive circuits near the speed controller or connected in the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

**Components which can be used in association with the Altivar:** see catalogue.

# Connection Diagrams

## Diagram with downstream contactor for ATV-58FHU18N4 to D23N4.

The shaded part should be added to the 3-phase power supply diagram.



Use the "downstream contactor control" function with relay R2, or logic output LO (== 24 V) with an I/O extension card.

Consult the programming manual.

**Note:**

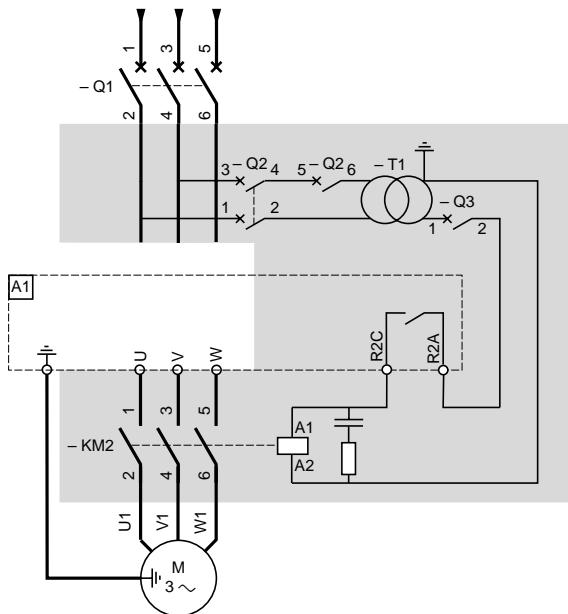
Fit interference suppressors to all inductive circuits near the speed controller or connected in the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

**Components which can be used in association with the Altivar:** see catalogue. Do not exceed the maximum current of 120 mA for the 24 V power supply.

# Connection Diagrams

## Diagram with downstream contactor for ATV-58FHD28N4 to D79N4

The shaded part should be added to the 3-phase power supply diagram.



Use the "downstream contactor control" function with relay R2, or logic output LO ( == 24V) switching the coil using an I/O extension card.

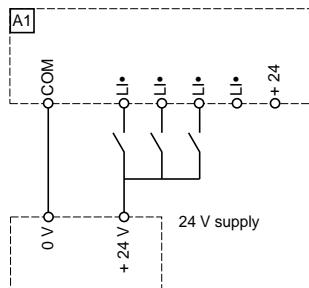
Consult the programming manual.

**Note:**

Fit interference suppressors to all inductive circuits near the speed controller or connected in the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

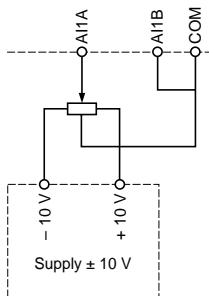
**Components which can be used in association with the Altivar:** see catalogue.

## 24 V external supply for supplying logic inputs

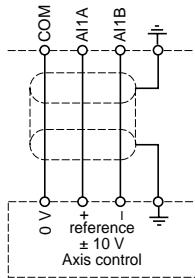


# Connection Diagrams

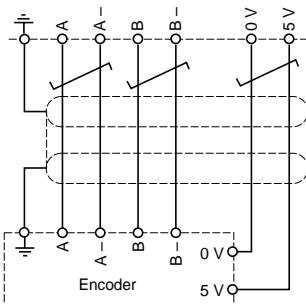
**Bi-polar speed reference:**



**Speed reference using axis control**



**Closed loop control : encoder wiring**



## Wiring recommendations

### Power

Observe the cable cross-sectional areas recommended in the standards.

The speed controller must be earthed to conform with the regulations concerning high leakage currents (over 3.5 mA). Do not use a residual current device for upstream protection on account of the DC elements which may be generated by leakage currents. If the installation involves several speed controllers on the same line, each speed controller must be earthed separately. If necessary, fit a line choke for speed controllers ATV-58FHU18N4 to D23N4 (consult the catalogue).

Keep the power cables separate from circuits in the installation with low-level signals (detectors, PLCs, measuring apparatus, video, telephone).

### Control

Keep the control circuits and the power cables apart. For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm connecting the shielding to each end.

## Recommendations for use

In power control mode using a **line contactor** :



- Do not switch contactor KM1 frequently  
(otherwise premature aging of the filtering capacitors will occur),  
**and use inputs LI1 to LI4 to control the speed controller,**
- If the cycles are < 60 s, these measures are absolutely necessary.

If safety standards necessitate isolation of the motor, fit a contactor on the speed controller output and use the "downstream contactor control" function (consult the programming manual).

## Fault relay, unlocking

The fault relay is energized when the speed controller is powered up and is not faulty. It has one C/O contact at the common point.

The speed controller is unlocked after a fault by:

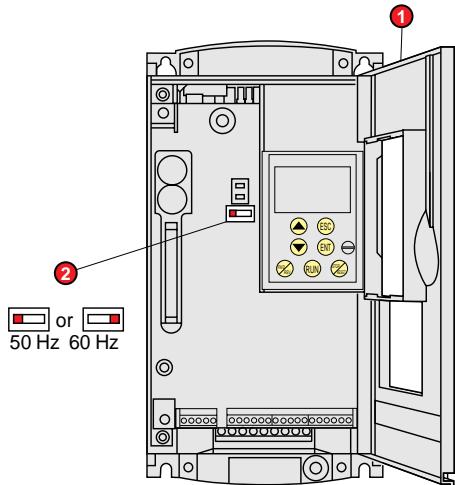
- powering down the speed controller until both the display and indicator lamps go out, then powering up again
- automatically or remotely via logic input: consult the programming manual.

## Programmable I/O, functions:

Consult the programming manual.

The Altivar is factory preset for the most common operating conditions.

## Prior to powering up the Altivar:



Unlock and open the cover **1** of the Altivar to access the 50/60 Hz selector switch **2** on the control board. If an option card is present, the selector switch can still be accessed.  
Position the selector switch on 50 or 60 Hz, whichever corresponds to your motor.

### Preset operating point:

50 Hz position (factory set-up):  
- 400 V 50 Hz

60 Hz position:  
- 460 V 60 Hz

Several tools are available to help with setup:

- display module ref. : VW3 A58101 (the speed controller is supplied with this display module).
- PC software and interface ref. : VW3-A8104 and VW3-A8106 to be ordered separately.

If the Altivar is equipped with an I/O extension or communication card, consult the documentation supplied with the card.

**Reminder for IT neutral point connection:** in the event of use on a 3-phase network with a voltage greater than 480V  $\pm 10\%$  with an isolated or high-impedance neutral system (IT), the internal EMC filter capacitors which are connected to ground must be disconnected. Consult Schneider product support who are the only people qualified to perform this operation.

## Checking the thermal state of the speed controller

Proceed as follows:

- operate the speed controller at the maximum operating and temperature conditions for the application.
- Using the display module or PC software,  
observe until the following parameter stabilizes: `DriveThermal.t_Hd` (menu 1-SUPERVISION)

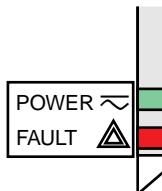
It must not exceed 100 %.

If this value is exceeded, check the mounting, conditions of use and size of the speed controller.

# Operation - Maintenance - Spares and Repairs

## Operation

### Signalling on the front panel of the Altivar



Green LED POWER

Red LED FAULT



on: Altivar powered up



- on: Altivar faulty
- flashing: Altivar locked following use of the "STOP" button on the display module or a configuration change. The motor must not be powered up until the "forward", "reverse" and "shutdown via injection" commands have been reset.

### Display mode on display module screen

- Displays preset frequency set point or faults.
- The display mode can be modified via the display module: consult the programming manual.

## Maintenance

Before working with the equipment, **switch off the power supply, check that the green LED is off, and wait for the capacitors to discharge** (approximately 3 minutes).



The DC voltage at the + and - terminals or PA and PB terminals may reach 850 V depending on the line supply voltage.

If problems arise during setup or operation, first ensure that the recommendations relating to environment, mounting and connections have been observed.

## Maintenance

The Altivar 58F does not require preventative maintenance. We nevertheless advise you regularly to:

- check the condition and tightness of connections
- ensure that the temperature around the unit remains at an acceptable level and that ventilation is effective (average service life of fans: 3 to 5 years depending on operating conditions)
- remove dust from the speed controller if necessary.

## Assistance with maintenance

The first fault detected is memorized and displayed on the display module screen if power is maintained: the speed controller locks, the red LED lights up, and the R1 fault relay is switched off.

Consult the programming manual.

## Spares and repairs

For spare parts and repairs to Altivar 58 speed controllers, consult Schneider group product support.



0 33 89110 29022 6

**VVDED399093**

**29022**

W9 1598249 01 11 A01

**2000-02**